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Comprehensive Solid Waste Management Study of Energy and Resource Recovery, Chautauqua County, New York

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Comprehensive Solid Waste Management Study Of Energy And Resource Recovery

Chautauqua County, New York

SUMMARY REPORT

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CHAUTAUQUA COUNTY COMPREHENSIVE SOLID WASTE MANAGEMENT STUDY OF ENERGY AND RESOURCE RECOVERY

Resource recovery from wastes generated in Chautauqua County is analyzed in this comprehensive study. Presently there is about 8.26 pounds of municipal, commercial and industrial solid wastes generated each day for each person in the County or 192,100 tons per year. By 1985 it is projected that this will increase to 204,715 tons per year. Of these totals approximately 70% of municipal-commercial wastes and 50% of the industrial wastes are combustible and, therefore, present an energy recovery potential. The non-combustible portions present materials recovery potential. It is the feasibility potential of energy/materials resource recovery from Chautauqua County wastes that is evaluated in this report.

Six major topics are presented:

1. The existing solid waste disposal system and determination of waste quantities for design parameters by a field weighing program.

2. Examination of existing and potential energy and materials markets which would utilize the recovered waste products.

3. Review of existing energy resource recovery technologies applicable to Chautauqua County energy markets.

4. Study of waste transport schemes for various resource recovery processing plant/fuel user locations.

5. Determination of specific solid and gaseous refuse derived fuel systems and application to site-specific energy user conditions.

6. Suggested implementation strategy.

Chautauqua County and the Existing Solid Waste Disposal System

Chautauqua County is located in the extreme southwest corner of New York State and is approximately 1,080 square miles in area.

It is bordered by Lake Erie on the north, by Pennsylvania from the south and west and Cattaraugus and Erie Counties, New York on the east. The population is approximately 57 percent urban, 34 percent rural non-farm and 9 percent rural farm. Jamestown and Dunkirk have the bulk of industry and urban population. The 1975 permanent population is 149,410 people.

The existing solid waste disposal system consists of three sanitary landfills, one near the city of Dunkirk, one at South Stockton and in the municipality of Chautauqua. In rural areas where there is no organized municipal, contract or private collection, the residents bring their wastes to one of the three landfill sites for disposal. No disposal fees are charged at the landfills; the operation is conducted and maintained by the County and derives its revenues for operation from taxes. Industries also utilize the landfills, but only for non-toxic wastes. Potentially hazardous and toxic wastes are the responsibility of the individual industries for disposal.

Solid Waste Generation and Classification

Solid waste generation and constituent mix was investigated in Chautauqua County during a two week field weighing and sampling program conducted at two landfill sites. Incoming wastes were weighed on portable scales prior to disposal in the landfill. The estimated per capita waste generation for Chautauqua County in 1975 is:

	LBS/Capita/Day
Residential and Commerical Wastes	4.00
Yard Cleanup	0.20
Industrial	4.06
TOTAL	8.26

The total County projected waste quantity for 1985, used for the system design, is 660 tons per day. Referring to the solid waste generation map, the total 1985 waste generation by municipality is given. A resource recovery system would accept municipal combustible and non-combustible wastes and industrial combustible wastes only, resulting in 430 tons per day or 132,000 tons per year. Although this represents the estimated waste quantity generated, the amount actually deliverable to a resource recovery facility was reduced 10 percent, based on previous experience with collection practices. Therefore, the estimated 1985 design waste quantity is 385 tons per day throughout for a resource recovery facility, with the remaining 275 tons per day of non-recyclible wastes to sanitary landfills.

Materials recovery from solid wastes possesses potential, based on the preliminary materials market survey. Industries within the regional area of Chautauqua County currently use a variety of secondary materials in their manufacturing processes. Potential difficulties concerning marketing of secondary materials are: (1) various product user specifications which the recovered materials must conform to before they can be considered for reuse, (2) delivery cost associated with shipment of recovered materials to an industry, (3) difficulty in obtaining long term contracts due to the volatile nature of the secondary materials market. Optimistic aspects of secondary materials recovery are: (1) secondary materials dealers are the primary source for secondary materials used by industry, therefore, an association with secondary materials dealers could alleviate the marketing of the recovered materials, (2) secondary materials utilized by industry in the Chautauqua County region are; various grades of waste paper, ferrous and non-ferrous metals, glass and some textiles. These materials are present in municipal solid wastes, (3) fourteen manufacturers and three secondary materials dealers expressed an interest in various types of non-virgin materials. These companies are listed in Appendix C-1, Exhibit 27 of the final report.

Potential energy markets for the combustible portion of solid wastes were investigated in Chautauqua County. Eighteen boiler installations were examined as potential refuse derived fuel users. The potential energy that could be generated from 385 tons per day of unprocessed solid wastes is equivalent

LEGEND

□ TOTAL WASTES GENERATED IN MUNICIPALITY TONS PER DAY - 6 DAYS PER WEEK

○ TOTAL WASTES ACTUALLY EXPECTED FROM MUNICIPALITY AT PROCESSING PLANT TONS PER DAY - 6 DAYS PER WEEK

ESTIMATED SOLID WASTE GENERATION
1985
CHAUTAUQUA COUNTY
NEW YORK

to approximately 102,500 pounds per hour of steam over 24 hours (assuming a 75 percent refined waste fuel fraction after waste processing, having 6630 BTU per pound). Therefore, boiler plant installations with average hourly steam loads of 125,000 pounds per hour were initially judged viable refuse derived fuel (RDF candidates). Out of the eighteen installations surveyed, only four steam plant candidates were deemed acceptable, separately or in combination, based on present or projected steam loads. They are (1) Jamestown Board of Public Utilities - Carlson Station, (2) Niagara - Mohawk Dunkirk Station, (3) State University of New York - Fredonia Campus Power Plant, (4) Cummins Engine Company. The four potential RDF candidates' locations are illustrated on the Fuel User Location map.

The Niagara - Mohawk Dunkirk Station and the Jamestown BPU Carlson Station presently use pulverized coal and could accept a solid type refuse derived fuel to supplement coal firing. SUNY - Fredonia presently has gas fired boilers and could accept a gasified refuse derived fuel. The Cummins Engine Company is planning to construct a coal fired boiler system that could accept a solid refuse derived fuel. Both the Cummins Engine Company and SUNY - Fredonia steam loads are not sufficiently large enough to accommodate all of the refuse derived fuel that could be produced from 385 tons of waste per day (30% RDF supplemental firing or less). Therefore, in conjunction with Cummins Engine Company and SUNY - Fredonia, the Jamestown BPU Carlson Station would also utilize a portion of the refuse derived fuel product.

Resource Recovery System

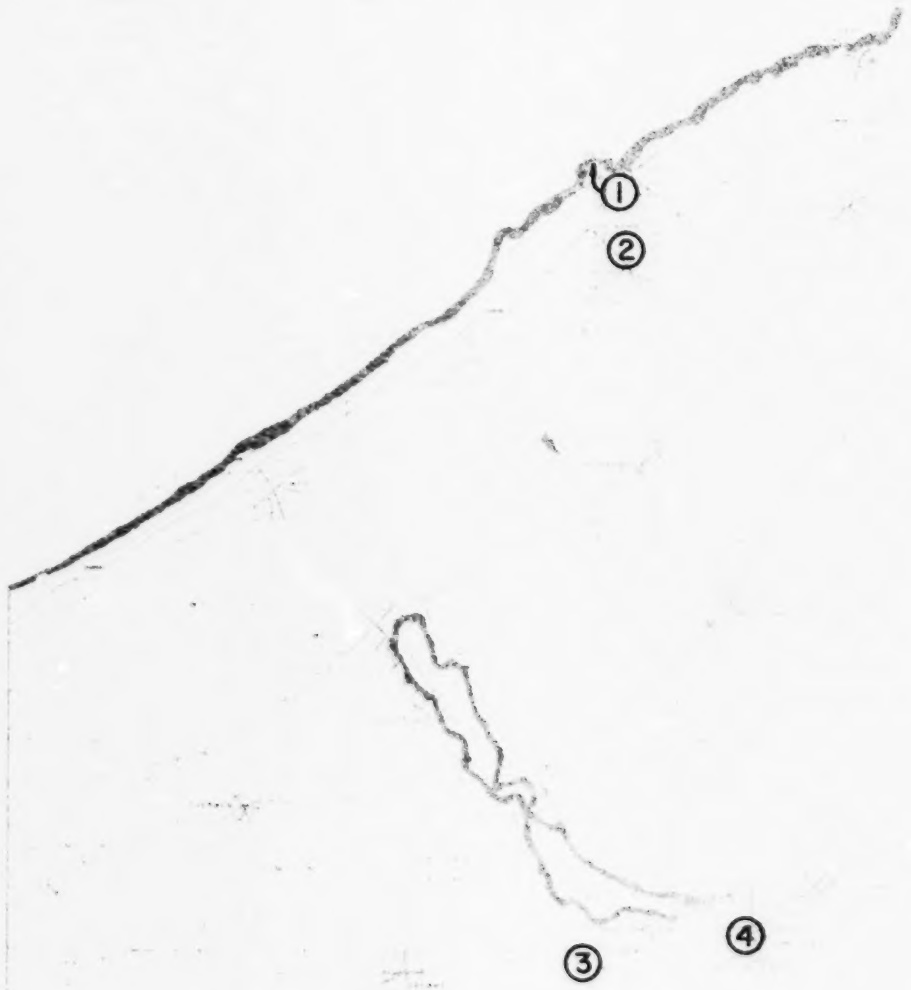
Two basic resource recovery systems are examined for use in Chautauqua County.

1. A resource recovery system that has the capability of producing a solid-refuse derived fuel supplement as well as ferrous/non-ferrous materials recovery.

2. A resource recovery system that produces a gaseous - refuse derived fuel supplement and ferrous materials recovery.

The solid refuse derived fuel waste processing facility considered, consists of a primary shredder, magnetic ferrous metal removal, trommel (non-ferrous removal) or air classifier, secondary shredder and pneumatic conveyance to fuel user.

The solid refuse derived fuel supplement itself consists of a 75 percent refined fuel fraction having 16 percent moisture, 15 percent inerts, and 6630 BTU per pound. From a daily input of 385 tons of unprocessed wastes, the resource recovery facility will generate approximately 287 tons per day of solid refuse derived fuel supplement. Approximately 20 tons per day of moisture is lost in the waste processing and 79 tons per day of recovered secondary materials/process residue is either marketed or landfilled. The potential energy available in 287 tons of refuse derived fuel is approximately 2,660 million BTU per day which is equivalent to approximately 102,100 pounds per hour of steam generation over 24 hours. The accompaning illustration provides a schematic/materials balance representation of the proposed solid-RDF facility.



POTENTIAL USER LOCATIONS FOR
ENERGY DERIVED FROM SOLID WASTES

LEGEND

1. NIAGARA-MOHAWK POWER GENERATION STATION
2. STATE UNIVERSITY OF N.Y., FREDONIA CAMPUS
3. CUMMINS ENGINE COMPANY
4. JAMESTOWN BOARD OF PUBLIC UTILITIES
   POWER GENERATION STATION

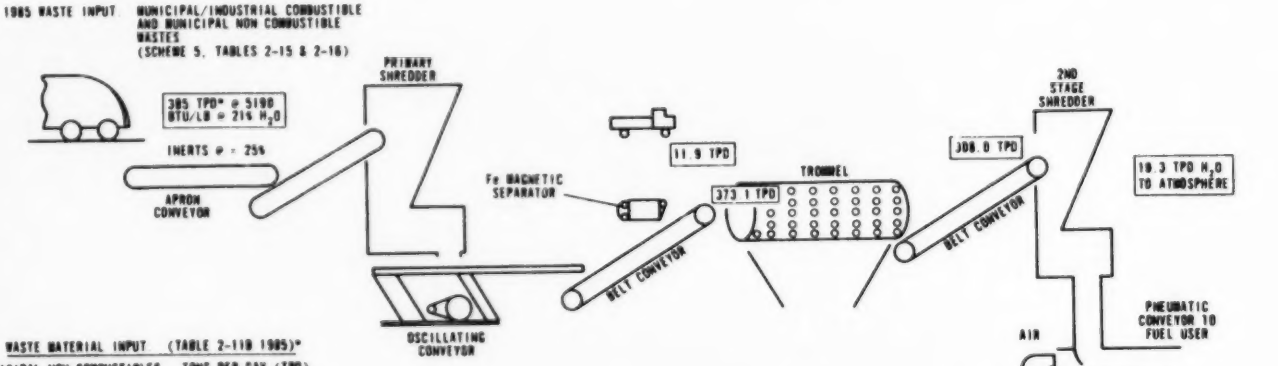
RESOURCE RECOVERY ANALYSIS
CHAUTAUQUA COUNTY, NEW YORK

GILBERT ASSOCIATES, INC.
Reading, Pa.

If the supplemental waste fuel has a value of $1.00 per million BTU, this corresponds to $10.88 per ton of refined fuel fraction or approximately $3,120 per day.

The gaseous refuse derived fuel supplement system considered most practical under these circumstances is the Union Carbide Corporation - Purox Process. Other gasification systems were not considered viable essentially because of the low heating value of the refuse derived fuel gas (lower than 300 BTU per standard cubic foot). The Purox gas is between 300 to 350 BTU per standard cubic foot. Lower gas heating values may require derating of boiler units as well as the requirement for significant modifications of boiler fuel piping, ducts and burners.

The Purox waste gasification system consists of refuse shredding, magnetic ferrous removal, gasification, and gas clean-up train. The Purox system is constructed in 350 tons per day module units, which would yield approximately 67 tons per day of ferrous metal and granular aggregate for marketing or landfill disposal and 252 tons per day of fuel gas. The fuel gas possesses approximately 5.25 million BTU per ton of waste processed or 1,840 million BTU per day. At $1.00 per million BTU this results in $2,150 per day for the Purox gas available from 350 tons per day. A generalized waste/gasification illustration is given. If the Purox gas revenue potential is compared to the solid RDF revenue potential for the same waste quantity processed daily, the solid RDF will generate approximately 31 percent more revenue than the Purox gas, because of the relative energy equivalent per ton of waste processed for each system.


1985 WASTE INPUT
MUNICIPAL/INDUSTRIAL COMBUSTIBLE AND MUNICIPAL NON COMBUSTIBLE WASTES (SCHEME 5, TABLES 2-15 & 2-16)
385 TPD* @ 5190 BTU/LB @ 21% H_2O
INERTS @ ~ 25%
APRON CONVEYOR
PRIMARY SHREDDER
Fe MAGNETIC SEPARATOR
11.9 TPD
373.1 TPD
TROMMEL
BELT CONVEYOR
OSCILLATING CONVEYOR
306.0 TPD
2ND STAGE SHREDDER
19.3 TPD H_2O TO ATMOSPHERE
PNEUMATIC CONVEYOR TO FUEL USER
AIR
286.7 TPD @ 6830 BTU/LB @ 10% H_2O TOTAL INERTS 15%
DIRT, CERAMICS DENSE NON FERROUS
3.3 TPD ASH, ROCK, DIRT
3.7 TPD Fe AND NON-Fe
28.5 TPD OF GLASS
31.6 TPD OF COMBUSTIBLE
67.1 TPD TOTAL

WASTE MATERIAL INPUT (TABLE 2-11B 1985)*

MUNICIPAL NON COMBUSTIBLES	TONS PER DAY (TPD)
1. FERROUS	14.9
2. NON FERROUS	11.7
3. GLASS	30.0
4. ASH, ROCK, DIRT	4.1
TOTAL MUNICIPAL NON COMBUSTIBLES	60.7
MUNICIPAL/INDUSTRIAL COMBUSTIBLES	316.3
TOTAL	385.0 @ 6 DAYS PER WEEK

* INCOMING WASTE LOAD REDUCED 10%, ASSUMING 90% COLLECTIBLE

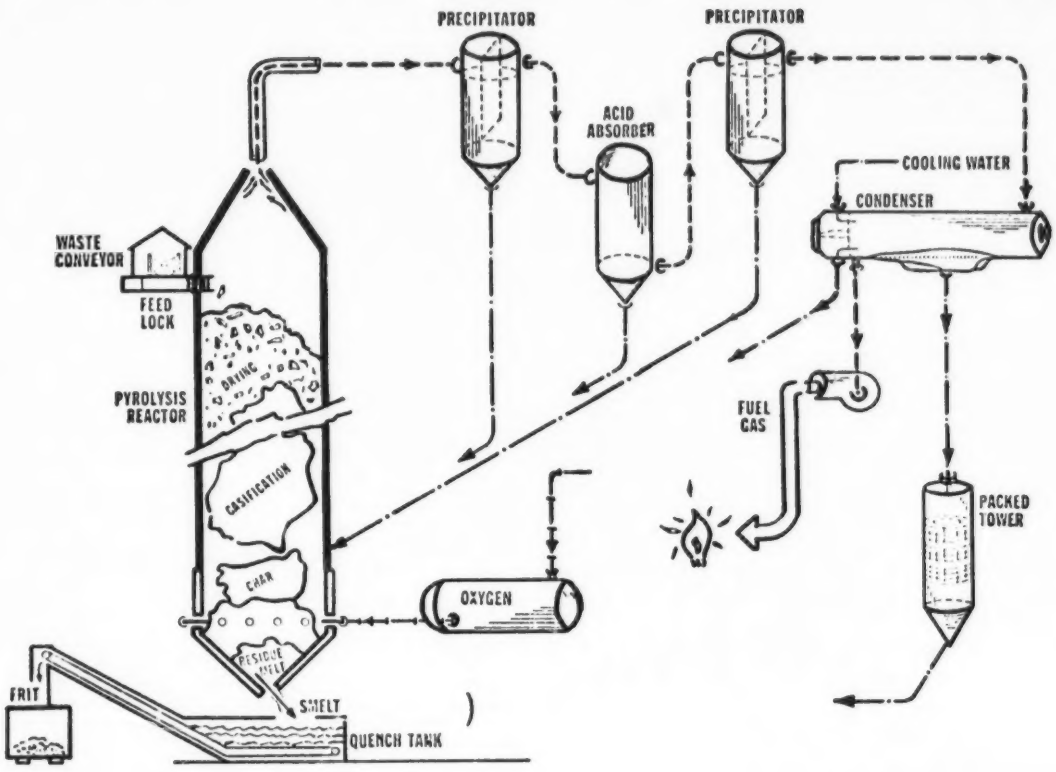
DAILY REFINED FUEL FRACTION (RFF)

COMBUSTIBLES	285.4 TPD
NON COMBUSTIBLES	21.3 TPD
	286.7 TPD

286.7 TPD / 385 TPD = 75% RFF

CHAUTAUQUA COUNTY, NEW YORK
RESOURCE RECOVERY ANALYSIS
FLOW DIAGRAM
REFUSE DERIVED FUEL PROCESSING SYSTEM

GILBERT ASSOCIATES, INC.
READING, PENNSYLVANIA



WASTE/FUEL GASIFICATION

General non-site specific solid and gaseous refuse derived fuel processing facility costs are as follows:

		Solid RDF Facility @ 385 TPD	Purox Gas Facility @ 350 TPD
1.	Estimated Capital Cost	$4,459,000	$18,799,400
2.	50% NYSDEC Construction Grant	-2,229,500	-9,399,700
3.	Capital Cost Local Share	$2,229,500	$ 9,399,700
4.	Annual Cost[a]	$ 978,800	$ 3,439,100
5.	Estimated Annual Revenue[b]	- 749,000	- 516,200
6.	Estimated Annual Operating Costs	$ 229,800	$ 2,922,900
7.	Estimated Cost per Ton	$ 2.11	$ 29.60

(a) Includes Debt Service of 7% for 10 years, financing coverage at 15% and annual plant operating costs.

(b) Revenue potential at $0.85 per million BTU; assumed to be 75% of conventional fuel costs of $1.15 per million BTU. Coal at 12,500 BTU/LB at $1.15 per million BTU equals $28.75 per ton.

Waste Transport Scheme Analysis

Waste transport costs associated with potential resource recovery locations in Chautauqua County are examined. The waste transport costs are not "household collection" costs, but the costs associated with transportating a waste quantity from a waste generating centroid in each town or municipality to the resource recovery plant or transfer station. Waste transport costs are presently not allocated to the County cost of landfill operation. This may also be true for resource recovery waste transport schemes, depending upon which transport scheme is actually utilized. The County would incur waste transport costs if a transfer station is built as part of the resource recovery system operation, by assuming the responsibility for capital and operating costs. If no transfer stations are constructed, the County will only be responsible for the transport of waste residues and non-marketable waste materials to the landfill for disposal.

Since it is ultimately the consumer who will pay for waste transport, whether it is a County or private industry operation, five waste transport schemes were examined for resource recovery facilities in Jamestown and Dunkirk, with and without the use of a transfer station. The "Total Waste" transport costs are compared to evaluate the most economical overall waste transport scheme.

"Direct County" waste transport costs are those costs that Chautauqua County would be responsible for, if that particular scheme is implemented, such as transfer station operating costs and resource recovery process residue transport costs to a landfill for disposal. "Total Waste" transport cost includes the Direct County costs plus the cost to direct haul wastes to a transfer station or resource recovery plant for processing, cost to transport wastes directly to the landfill for a 30 day period each year due to resource recovery plant/fuel user shutdown, and the cost to transport non-processible non-recyclible wastes to the landfill for disposal.

When the "Total Waste" transport costs are compared, the most efficient system for total County waste transport will be obvious. Referring to the following waste transport schemes and costs:

Waste Transport Scheme	Estimated Direct County Waste Transport Costs		Estimated Total County Waste Transport Costs	
	Annual	Per Ton	Annual	Per Ton
I: One resource recovery (R.R.) facility in Jamestown; transfer station in Dunkirk; R.R. residue to proposed Busti Landfill	$301,900	$2.30	$797,300	$3.50
II: One resource recovery facility in Dunkirk; transfer station in Jamestown; R.R. residue to proposed Arkwright landfill	$410,400	$3.15	$887,400	$3.90
III: Two resource recovery facilities one each in Jamestown and Dunkirk; direct haul all wastes.	$ 85,900	$3.85	$588,700	$2.60

Waste Transport Schemes	Estimated Direct Count Waste Transport Costs Annual	Per Ton	Estimated Total County Waste Transport Costs Annual	Per Ton
IV: One resource recovery facility in Jamestown; direct haul all wastes.	$ 48,800[a]	$2.20	$802,900	$3.50
V: One resource recovery facility in Dunkirk; direct haul all wastes to facility.	$ 51,400[a]	$2.30	$881,500	$3.90
VI: Direct haul all wastes to existing landfills; South Stockton, Dunkirk and Chautauqua.	0	0	$498,200	$2.40
VII: Direct haul all wastes to proposed landfills; Busti and Arkwright.	0	0	$537,200	$2.60

Although the lowest "Direct County" waste transport cost for resource recovery is Scheme IV at $48,800, the "Total County" cost is $802,900, which is not the most economic "Total County" waste transport cost. Scheme I is the most economic "Total County" waste transport scheme at $797,300.

It is estimated that the present "Total County" waste transport cost is $498,200, Scheme VI, direct haul to three sanitary landfills. Direct haul to the two proposed landfills in Busti and Arkwright would be approximately $537,200 as "Total County" waste transport costs, Scheme VII. There are no Direct County costs associated with the current landfill options, since transfer stations are not needed if the landfills are located in the approximate areas of Arkwright and Busti.

Site Specific Energy Recovery Schemes

Seven site specific energy and materials resource recovery schemes are examined for Chautauqua County. These seven sites specific schemes evolve around the four potential RDF energy users; Jamestown BPU Carlson Station, Niagara - Mohawk Dunkirk Station, SUNY - Fredonia Campus, and the Cummins Engine Company. The seven site specific resource recovery alternatives are:

1. Alternative A: Energy recovery at the Jamestown BPU Carlson Station, utilizing a solid refuse derived fuel.

2. Alternative B: Energy recovery at the Jamestown BPU Carlson Station utilizing the Purox gasified refuse derived fuel.

[a] This Direct County Cost is only for the transport of resource recovery processing plant residue to the sanitary landfill for disposal.

3. Alternative C-1: Energy recovery at two locations: (1) SUNY - Fredonia, utilizing a gasified refuse derived fuel (Purox) and (2) Jamestown BPU Carlson utilizing a solid refuse derived fuel.

4. Alternative C-2: Energy recovery at two locations: (1) Cummins Engine Company and (2) Jamestown BPU Carlson Station, both utilizing a solid refuse derived fuel.

5. Alternative D-1: Energy recovery at the Niagara - Mohawk Dunkirk Station utilizing a solid refuse derived fuel from Chautauqua and Erie Counties. Chautauqua County uses its own resource recovery plant to produce a solid RDF.

6. Alternative D-2: Energy recovery at the Niagara - Mohawk Dunkirk Station utilizing a solid refuse derived fuel from Chautauqua County only.

7. Alternative E: Transfer Chautauqua County processible wastes to the Erie County - Niagara Mohawk resource recovery facility for processing into a solid refuse derived fuel.

Alternatives A, B and C-2 include a transfer station located in Dunkirk for transfer of wastes to Jamestown. Alternative C-1 does not include a transfer station, since the location of the two resource recovery facilities are near Dunkirk and Jamestown. Alternatives D-1 and D-2 include a transfer station located in Jamestown, for transfer of wastes to Dunkirk. Alternative E includes two transfer stations, one in Jamestown and one in Dunkirk, for transfer of all Chautauqua County processible wastes to the Erie County - Niagara Mohawk resource recovery facility in Erie County.

Provided is an estimate of the Capital and Operating Costs of the various alternatives, including the 50% New York State Department of Environmental Conservation Capital Construction Grant. For alternatives B and C-1, in which the Purox gasification system is considered for the Jamestown BPU and SUNY - Fredonia, costs are also developed for the possibility of obtaining a 100% construction grant. (50% construction grant from NYSDEC and 50% from either the fuel user or possibly a federal grant.)

Also included in the annual operting costs for Alternatives A and B is an examination of the total County waste costs if: (a) the Jamestown BPU is charged 75% of their present fuel costs for the refuse derived fuel ($0.85 per million BTU) by the County to offset its operating expenses, (b) the refuse derived fuel is given to the Jamestown BPU for free - no charge and the County would bear the entire cost of the resource recovery system.

ESTIMATED CHAUTAUQUA COUNTY RESOURCE RECOVERY SYSTEM CAPITAL COSTS[a]

	Total System Capital Cost	NYSDEC[b] Grant	Chautauqua County Capital Cost Local Share
1. ALTERNATIVE A Jamestown BPU; solid-RDF	$ 5,610,000	$ 2,685,000	$ 2,925,000
2. ALTERNATIVE B Jamestown BPU; gas-RDF	19,940,600	9,850,300	10,090,300
3. ALTERNATIVE C-1 SUNY-Fredonia; gas-RDF Jamestown BPU; solid-RDF	23,695,300	11,847,700	11,847,700
4. ALTERNATIVE C-2 Cummins Engine Co.; solid-RDF Jamestown BPU; solid-RDF	7,450,900	3,605,500	3,845,500
5. ALTERNATIVE D-1 Niagara-Mohawk; solid-RDF from Chautauqua & Erie Counties	4,859,000	2,260,300	2,598,700
6. ALTERNATIVE D-2 Niagara-Mohawk; solid-RDF from Chautauqua Co. only	5,807,000	2,734,300	3,072,700
7. ALTERNATIVE E Transfer Chautauqua Co. Wastes to Erie Co. Resource Recovery Facility	1,097,000	274,250	822,750

(a) Does not include Capital Cost associated with constructing additional landfill disposal sites. This could add an additional $2,000,000 to the local share of Chautauqua County capital costs.

(b) Includes 50% NYSDEC Construction Grant for a resource recovery facility and 25% NYDEC Construction Grant for transfer stations.

The annual resource recovery total system costs presented include: (a) cost to own and operate the resource recovery facility, (b) direct County waste transport cost, (c) estimated landfill cost savings incurred by some wastes being recovered instead of landfilled, (d) estimated revenue from sale of the refuse derived fuel. It is assumed no revenue is derived from materials recovery. Table 7-27 has the above costs and credits listed separately.

ESTIMATED CHAUTAUQUA COUNTY ANNUAL RESOURCE RECOVERY SYSTEM COSTS

	Total System Chautauqua County Annual Costs Including RDF Revenues	Cost Per Ton[a]
1. ALTERNATIVE A		
Jamestown BPU: solid-RDF		
- Charge BPU for RDF @ $0.85/MBTU	$ 1,113,000	$ 5.40
- No charge to BPU for RDF	$ 1,862,000	$ 9.00
2. ALTERNATIVE B		
Jamestown BPU: gas-RDF		
50% construction grant:		
- Charge BPU for RDF @ $0.85/MBTU	$ 3,587,500	$17.40
- No charge to BPU for RDF	$ 4,103,700	$19.90
100% construction grant:		
- Charge BPU for RDF @ $0.85/MBTU	$ 1,994,500	$ 9.70
- No charge to BPU for RDF	$ 2,510,500	$12.20
3. ALTERNATIVE C-1		
SUNY-Fredonia: gas-RDF		
Jamestown BPU: solid-RDF		
50% construction grant:		
- combined system costs	$ 3,754,100	$18.20
100% construction grant:		
- combined system costs	$ 2,228,400	$10.80
4. ALTERNATIVE C-2		
Cummins Engine Co.: solid-RDF		
Jamestown BPU: solid-RDF		
- combined system costs	$ 1,422,800	$ 6.90
5. ALTERNATIVE D-1		
Niagara-Mohawk: solid-RDF		
from Chautauqua and Erie Counties	$ 865,600	$ 4.20
6. ALTERNATIVE D-2		
Niagara-Mohawk: solid-RDF		
from Chautauqua Co. only	$ 943,200	$ 4.60
7. ALTERNATIVE E		
Transfer Chautauqua Co.		
Wastes to Erie Co. Resource		
Recovery Facility	$ 770,200	$ 3.75

(a) Total 1985 waste quantity estimated at 660 tons per day or 205,920 tons per year. Since the annual costs or cost per ton include the annual costs associated with resource recovery and landfill disposal for the entire County wastes, these costs are Total Waste Disposal Cost estimates for Chautauqua County.

SUMMARY RECOMMENDATIONS AND CONCLUSIONS

Recommendations

In light of the close comparison of costs for Alternatives E, D-1, D-2, and A, all within a $1.65 per ton range, several recommended options for Chautauqua County are given:

1. Beginning with the least total cost resource recovery system (Alternative E), utilizing the Erie County-Niagara Mohawk resource recovery processing system, via transfer trailer hauling of Chautauqua unprocessed wastes, Chautauqua County officials should explore, with the appropriate Erie County and Niagara-Mohawk officials, the possibility of implementing a regional multi-county resource recovery system. It will be necessary to initially explore Niagara-Mohawk's interest to participate in such a proposal with Chautauqua County. Focal points of the initial discussion could include:

   - will potential problems arise from transporting processed and unprocessed wastes across county boundaries;
   - residue management from processed wastes at the resource recovery facility;
   - Niagara-Mohawk Erie County tipping fees;
   - potential RDF revenue posture of Erie County with respect to sale of contributing Chautauqua County RDF;
   - capital contributions;
   - basic type agreement necessary between Niagara-Mohawk, Erie County and Chautauqua County;
   - length of agreement.

2. Should the discussions concerning potential implementation of Alternative E not prove fruitful, Chautauqua County officials could then approach Niagara-Mohawk with the recommended program outlined for Alternative D-1, which provides that Chautauqua County construct its own resource recovery facility, but utilize the Niagara-Mohawk-Dunkirk Station as a fuel user of solid-RDF along with Erie County wastes. Chautauqua County would deliver solid-RDF to the receiving area at the Dunkirk Station. Thus, the only interface with Erie County wastes would be that Chautauqua County would use the same RDF receiving area at the Dunkirk Station. It should be noted that the Chautauqua County and Erie County solid-RDF would both be processed to a 75 percent refined fuel fraction. Therefore, it is anticipated that there should not be any significant difference in burning characteristics. Each waste processing plant will be required to maintain the necessary quality control.

3. If the Erie County wastes are not utilized at the Dunkirk Power Station, Chautauqua County could follow the plan outlined in Alternative D-2, which includes Chautauqua County constructing its own resource recovery system and utilizing the Dunkirk Power Station as an RDF fuel user. The difference between Alternatives D-1 and D-2 is that Erie County Wastes are not utilized at the Dunkirk Station, at least at that point in time. The Chautauqua County officials could contact the Niagara-Mohawk Power Company to work out the details of the proposed resource recovery plan outlined in Alternative D-2.

4. Should terms with the Niagara-Mohawk Power Company not be workable, Chautauqua County officials could proceed to discuss the plant outlined in Alternative A - utilizing the Jamestown BPU Carlson Station with a solid-RDF supplement.

5. If an arrangement with the Jamestown BPU cannot be worked out in which they can accept all the solid-RDF, the Cummins Engine Company at Lakewood should be contacted. Talks should then proceed with the Jamestown BPU and Cummins Engine Company officials, both using a solid-RDF. This is the plan outlined for Alternative C-2. Required here will be a commitment from the Cummins Engine Company as to (1) when they plan to construct their new boiler facility; (2) insure that the new boiler facility will be capable of accepting a solid prepared refuse derived fuel; (3) insure their load projections for the boiler facility are at least those used to determine the feasibility of this Alternative (80,000 pph steam over 24 hours); (4) it would be desirable if the new boiler facility could be designed to accept a greater portion of RDF than was expressed as a minimum in the Alternative C-2 report discussion, so that during BPU outages for repair, etc., the Cummins Engine Company facility could accept at least some of the excess RDF. This greater capacity would also reduce on-site storage requirements at Cummins. This alternative is estimated at $6.90 per ton to accommodate the wastes in the County; $3.15 per ton higher than Alternative E.

6. Once a definite fuel user(s) has been established, the County should then pursue a detailed feasibility study with preliminary engineering design to obtain definitive costs for the resource recovery system finally selected.

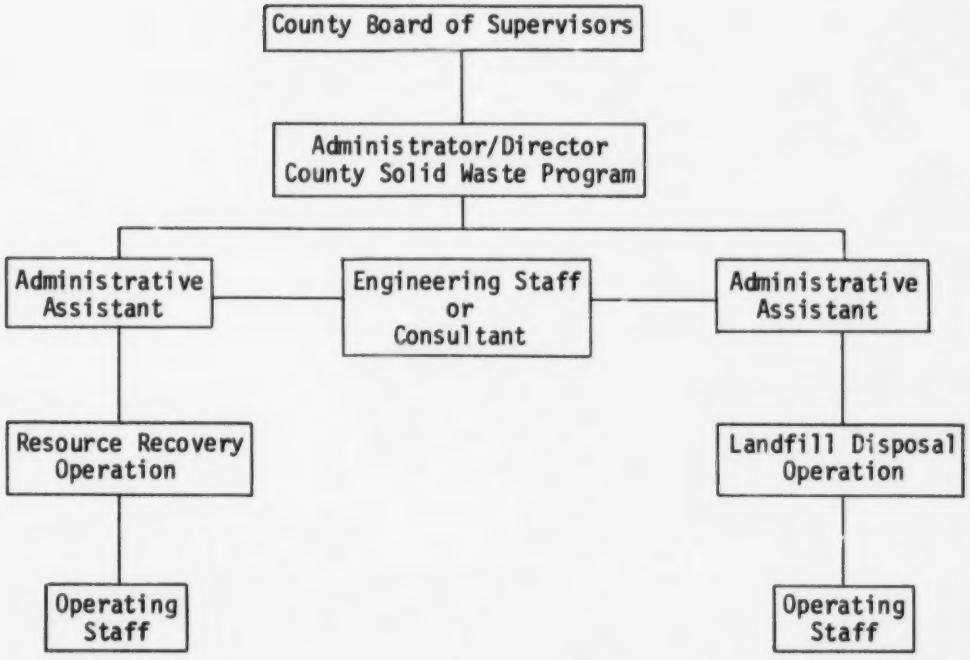
7. Should the New York State Department of Environmental Conservation Construction Grant for 50% of the capital costs not be available, Chautauqua County could consider proceeding with the four top ranked resource recovery alternatives E, D-1, D-2 and A. The annual costs for each of these alternatives, without the grant, are as follows: Alternative E, $809,200 or $3.95 per ton; Alternative D-1, $1,207,900 or $5.90 per ton; Alternative D-2, $1,363,200 or $6.60 per ton; Alternative A, $1,532,900 or $7.40 per ton.

8. Since the incremental additional costs per ton is small with the NYSCED Construction Grant, for the first four recommended alternatives (E, D-1, D-2, A), the County should proceed to implement one of these programs.

Implementation Strategy

The implementation of one of the resource recovery plans previously presented will involve developing a definite operating-ownership arrangement between the potential fuel user and the County. As soon as the fuel user has been determined and the contractual agreements drawn up, the County will need to establish an organization within the County government to handle the daily operation of the resource recovery system. Provided is a suggested organization for modifying the existing Chautauqua County solid waste organization.

SUGGESTED ORGANIZATION FOR MODIFYING THE
EXISTING COUNTY SOLID WASTE ORGANIZATION



Potential arrangements that could be made between the prospective fuel user and the County are as follows:

1. Chautauqua County builds, owns, and operates the solid-RDF resource recovery facility. The fuel user(s) maintains his receiving RDF and boiler feed installation.

2. Chautauqua County and the fuel user(s) jointly construct, own, and operate the resource recovery facility.

3. Chautauqua County owns the resource recovery facility, the fuel user operates the facility. The County provides the wastes to the facility and removes the residuals.

4. Chautauqua County only provides waste to the resource recovery facility (removes the residuals). The fuel user owns and operates the resource recovery facility.

5. Chautauqua County contracts with private industry to either operate, build and operate, or build, own and operate a resource recovery facility. Depending on the arrangement, either private industry or Chautauqua County would contract with a fuel user(s), and for sale of recoverable secondary materials.

Costs of the above schemes will, of course, be an important criteria in determining the final scheme selected. An important aspect of County involvement in the owning of the resource recovery facility is that the New York State DEC Construction Grant for 50% of the capital costs will be available and should be helpful to offset some of the County disposal costs. If the County does not participate in ownership of the

resource recovery facility, the grant monies for the facility might be forfeited. Should the fuel user elect to operate the facility, he may feel that he has better quality control of the product RDF to be utilized. This could be a desirable aspect for the fuel user and avoids potential interface problems.

Contractual agreements between the County and the fuel user will vary, depending upon the type and complexity of the actual resource recovery plan implemented. These considerations are too long to list here; however, they are presented in Chapter 8 of the report.

Possible financing methods for the local Chautauqua County capital share will be governed by the existing state laws regarding County financing. Some possible methods of financing all or part of the resource recovery system capital costs include general obligation bonds, revenue bonds, pollution control bonds or loans.

The resource recovery programs presented can benefit Chautauqua County by conserving energy and materials from wastes, as well as through the potential economic impact to the County. Solid waste problems are difficult problems to solve in a manner which is economically, politically, and socially acceptabel to everyone. The resource recovery systems discussed appear to be cost competitive with traditional landfill disposal. The implementation of one of the feasible systems should be given serious consideration.

The report summary program is presented
in the
COMPREHENSIVE SOLID WASTE MANAGEMENT STUDY
OF ENERGY AND RESOURCE RECOVERY

Copies are available from the
Chautauqua County Department of Planning

State of New York
Department of Environmental Conservation
Peter A. A. Berle, Commissioner

Division of Solid Waste Management
William G. Bentley, Director

Chautauqua County Executive
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John R. Luensman, Director

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